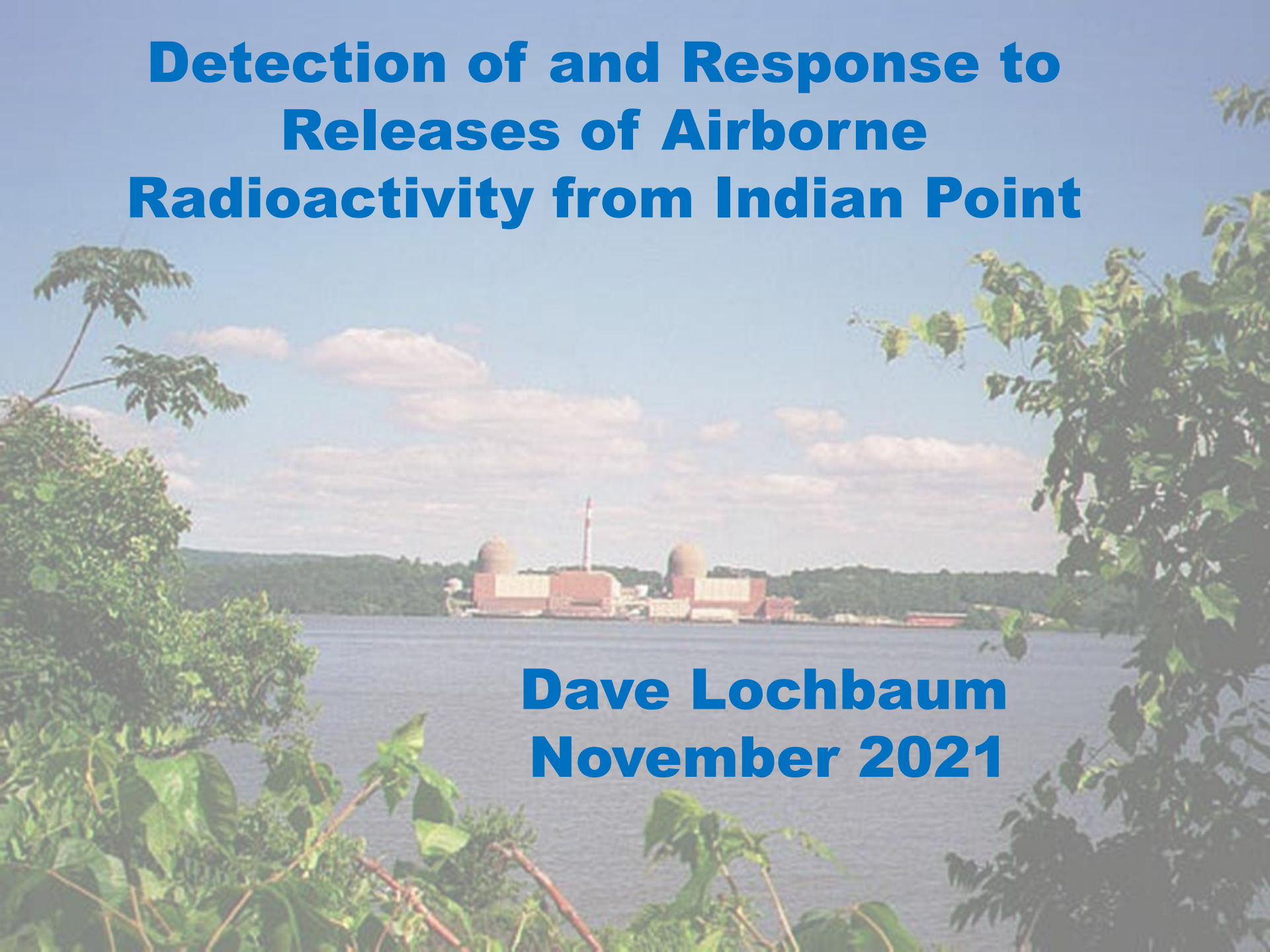


Detection of and Response to Releases of Airborne Radioactivity from Indian Point

**Dave Lochbaum
November 2021**



Radiation Detection

Onsite Continuous Monitoring

Before tanks of radioactively contaminated gases are vented, they are sampled. The sample results along with the amount of gas in the tank at the planned release rate are used to ensure the discharge complies with federal limits.

Before pipes are cut, walls torn down, equipment removed, etc., surveys are conducted to ascertain the location and extent of radiological and non-radiological hazards (if any). The survey results are used to take appropriate precautions such as flushing a pipe with chemicals to remove radioactive materials from inner surfaces, applying a coating that “glues” hazardous materials to outer surfaces, or providing ventilation that pulls airborne materials released during cutting/moving through filters before being released.

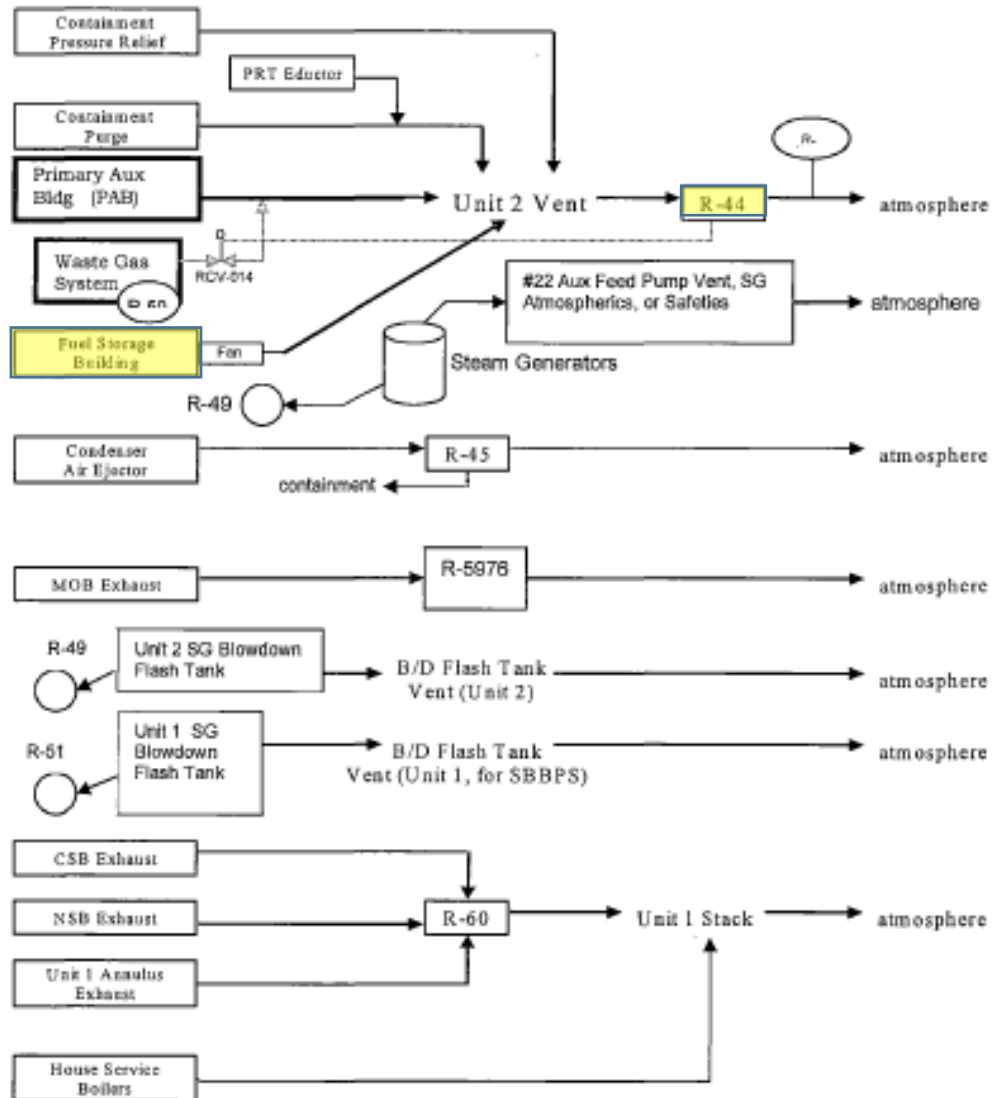
Such efforts are pre-release measures taken to protect workers and the public from any releases.

CHANNEL	MONITOR DESCRIPTION	SAMPLING LOCATIONS	TYPICAL RANGE ¹	EFFLUENT CONTROL FUNCTIONS
R-42	Containment Gas Monitor	72' Fan Bldg	2.3E-8 to 2.3E-2 $\mu\text{Ci/cc}$	Containment Ventilation Isolation
R-44	Plant Vent Radiogas Monitor	88' Fan Bldg	4.6E-7 to 4.6E-1 $\mu\text{Ci/cc}$	Shuts RCV-014 (isolating gas tanks), stops VC release fans and shuts VC vent/purge valves. (The charcoal bank remains in service at all times).
R-45	Condenser Air Ejector Monitor	In-line detector on the air ejector exhaust header	4.5E-7 to 4.5E-1 $\mu\text{Ci/cc}$	Alarm diverts air ejector exhaust to VC and secures steam to priming air ejector re-heaters.
R-50	Waste Gas Disposal System Monitor	98' PAB	0.1 to 1E5 Curies	None. RECS D3.2.6 is assured by setpoint basis per ODCM Part II, Sec 3.1.12.
R-27	Plant Vent Wide-Range (Accident) Monitor	Drawn from inside Plant Vent, to 85' BAB	Ch1-3) E-7 to E+6 $\mu\text{Ci/cc}$ Ch4) 10 to E+13 $\mu\text{Ci/sec}$	None. PV Concentration and release rate information only, for accident applications.
R-60	Unit 1 Stack Vent Radiogas Monitor	Unit 1 Nuclear Services Bldg 100' Elevation	4.6E-7 to 4.6E-2 $\mu\text{Ci/cc}$	None
R-46 / 53	Fan Cooler Unit Service Water Return	Adjacent to service water return line from V.C. fan cooler units and motor coolers	1E-7 to 1E-1 $\mu\text{Ci/ml}$	None
R-47	Component Cooling System pump outlet	Adjacent to line monitors on each pump outlet	1E-7 to 1E-1 $\mu\text{Ci/ml}$	None. Setpoints are not based on effluent. They are for ALARA and information only.
R-39 / 40	Component Cooling Heat Exchanger Service Water Monitors	80' PAB	1E-7 to 1E-1 $\mu\text{Ci/ml}$	None
R-54	Waste Disposal Liquid Effluent Monitor	In-line monitor on 70' CSB	4.3E-8 to 4.3E-2 $\mu\text{Ci/ml}$	Terminates Distillate Tank releases on alarm
R-49	SG Blowdown Monitor	15' Transformer Yard Housing	1.1E-7 to 1.1E-1 $\mu\text{Ci/ml}$	Closes blowdown isolation valves

¹ Actual Ranges of Rad Monitors (in Engineering Units) are a function of the selection of isotopes (average energy) and other factors.

Detectors (channels) monitor for radiation in air flow leaving structures containing radioactive materials.

UNITS 1 and 2 GASEOUS EFFLUENT SIMPLIFIED FLOW DIAGRAM



The ventilation system may combine exhaust lines to then pass the combined flow past a common detector.

For example, the flow from the Fuel Storage Building joins the flow exhausted from the Primary Auxiliary Building (PAB) to pass by radiation detector R-44 before being released to the atmosphere.

TABLE 1 – 2 Unit 3 Effluent Radiation Monitor System Data

CHANNEL	MONITOR DESCRIPTION	SAMPLING LOCATIONS	TYPICAL RANGE ¹	EFFLUENT CONTROL FUNCTIONS
R-12	Containment Gas Monitor	Samples drawn from 32 and 35 Containment Fan Coolers	9.2E-8 to 9.2E-2 $\mu\text{Ci/cc}$	Containment Ventilation Isolation
R-14	Plant Vent (PV) Radiogas Monitor	Installed within the plenum of the Plant Vent, 105' elevation	1.6E-7 to 1.6E-1 $\mu\text{Ci/cc}$	Secures waste gas tank release, isolates containment, aligns PV charcoal
R-15	Condenser Air Ejector Monitor	Adjacent-to-line detector, on the exhaust header, 53' Turbine Hall	2.8E-7 to 2.8E-1 $\mu\text{Ci/cc}$	On alarm, diverts air ejector exhaust to VC and secures steam to priming air ejectors re-heaters
R-20	Waste Gas Disposal System Monitor	Adjacent to line, on suction to waste gas compressors	1E-2 to 1E+3 $\mu\text{Ci/cc}$	None. This setpoint is based on limiting 50,000 Ci per tank, per RECS D3.2.6.
R-27	Plant Vent Wide-Range (Accident) Monitor	Drawn from inside Plant Vent to fan house near 80' airlock	Ch1-3) E-7 to E+5 $\mu\text{Ci/cc}$ Ch4) 10 to E+13 $\mu\text{Ci/sec}$	(Same functions as R-14)
R-46	Administration Building Vent Radiogas Monitor	4 th Floor Administration Building Monitor Exhaust Plenum for Controlled Areas	1E+1 to 1E+6 cpm (approx 5.0E-8 to 5.0E-2 $\mu\text{Ci/cc}$)	None
R-59	RAMS Building Vent Radiogas Monitor	55' RAMS Building Monitor Exhaust Plenum	1E-6 to 1E+2 $\mu\text{Ci/cc}$	None
R-16 A/B	Fan Cooler and Motor Cooler Service Water Return	Adjacent to service water return line from V.C. fan cooler units and motor coolers	7.1E-7 to 7.1E-1 $\mu\text{Ci/ml}$	None
R-17 A/B	Component Cooling System pump outlet	Adjacent to line monitors on each pump outlet	2.3E-6 to 2.3E-1 $\mu\text{Ci/ml}$	None. These setpoints are based on early indication of RCS leak into CCW.
R-23	Component Cooling Heat Exchanger Service Water Monitor	Adjacent to line, mounted on SW return from Component Cooling Heat Exchanger	1.3E-6 to 1.3E-2 $\mu\text{Ci/ml}$	None
R-18	Waste Disposal Liquid Effluent Monitor	In-line monitor on monitor tank recirc pump discharge	4.0E-8 to 4.0E-2 $\mu\text{Ci/ml}$	Terminates monitor tank release on alarm
R-19	SG Blowdown Monitor	PAB blowdown room monitors steam generator blown	7.0E-8 to 8.2E+2 $\mu\text{Ci/ml}$ (using 2 ranges, per RG 1.97)	Closes blowdown isolation valves and SG sample valves
R-61	Condensate Polisher Facility (CPF) Regen Waste Release Monitor	Recirc line of HTDS/LTDS tanks in CPF (used during a primary to secondary leak).	1E-7 to 1E-1 $\mu\text{Ci/ml}$	Terminates HTDS or LTDS tank release. Applicable only in a primary to secondary leak, as defined in RECS D1.1.

¹ Actual Ranges of Rad Monitors (in Engineering Units) are a function of the selection of isotopes (average energy) and other factors.

Detectors (channels) monitor for radiation in air flow leaving structures containing radioactive materials.

<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML21168A060>

“The ARMs [Area Radiation Monitors] monitor the gamma radiation levels in units of mR/hr at selected areas throughout the station. If radiation levels exceed a preset limit in any channel, the Control Room annunciator and local alarms will be energized to warn of abnormal or significantly changing radiological conditions. The alarm limit is normally set at approximately 10 times normal background for each channel.” (page 61)

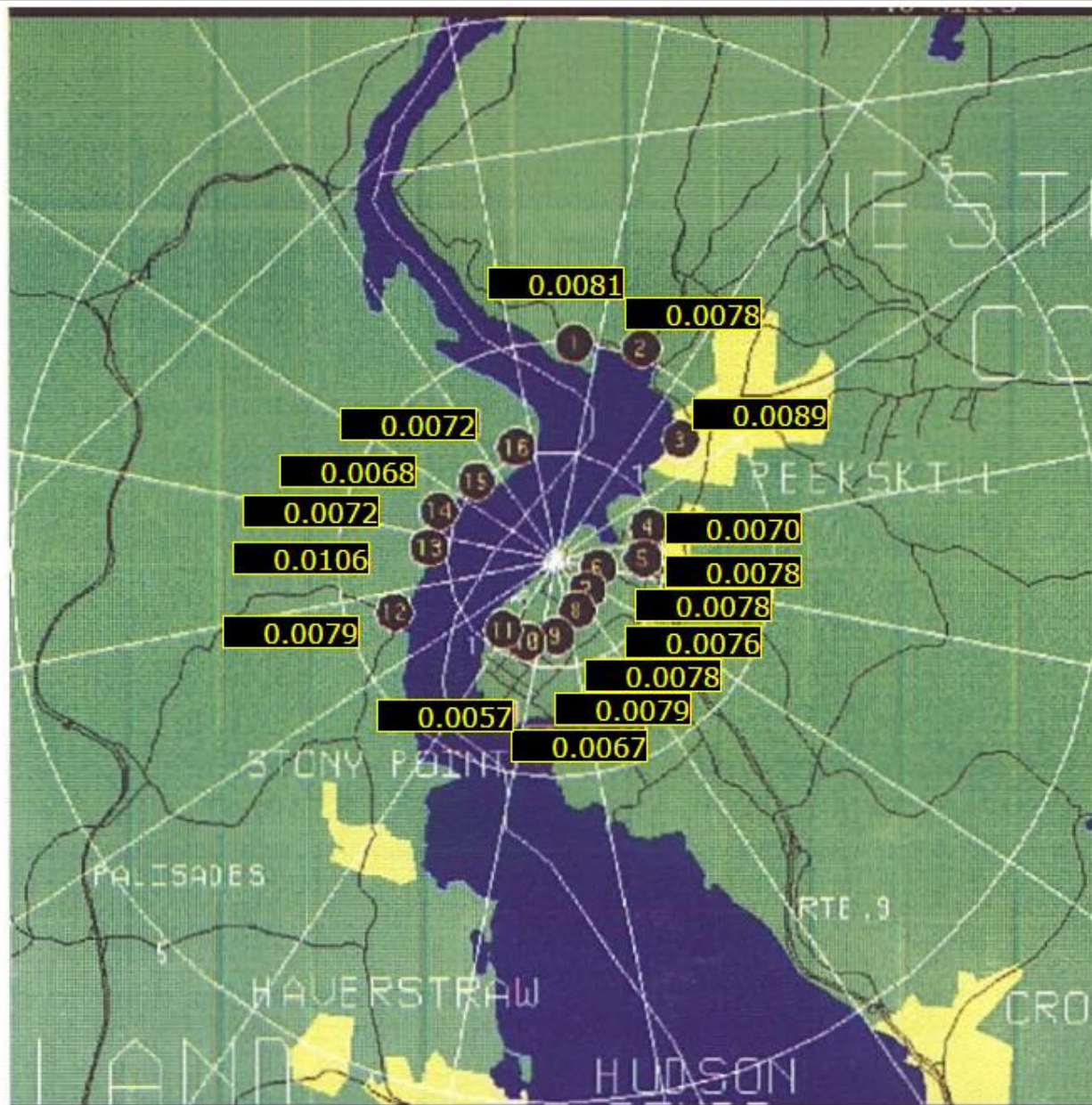
Area Radiation Monitors may indicate an unplanned release of radiation within a building, enabling workers to evacuate the area and initiate steps to terminate the release even before an exhaust vent detector alarms.

Radiation Detection

Offsite Continuous Monitoring

“A Reuter Stokes Radiation Monitoring System consisting of a network of monitors is installed in each of the 16 sectors around the Indian Point Energy Center Site at a distance of 0.5 to 2.5 miles. These devices will continuously telemeter, via radio, radiation level readings to a computer system, which can be accessed in the EOF, AEOF, IPEC Central Control Rooms and local and State EOCs.” (page I-5)

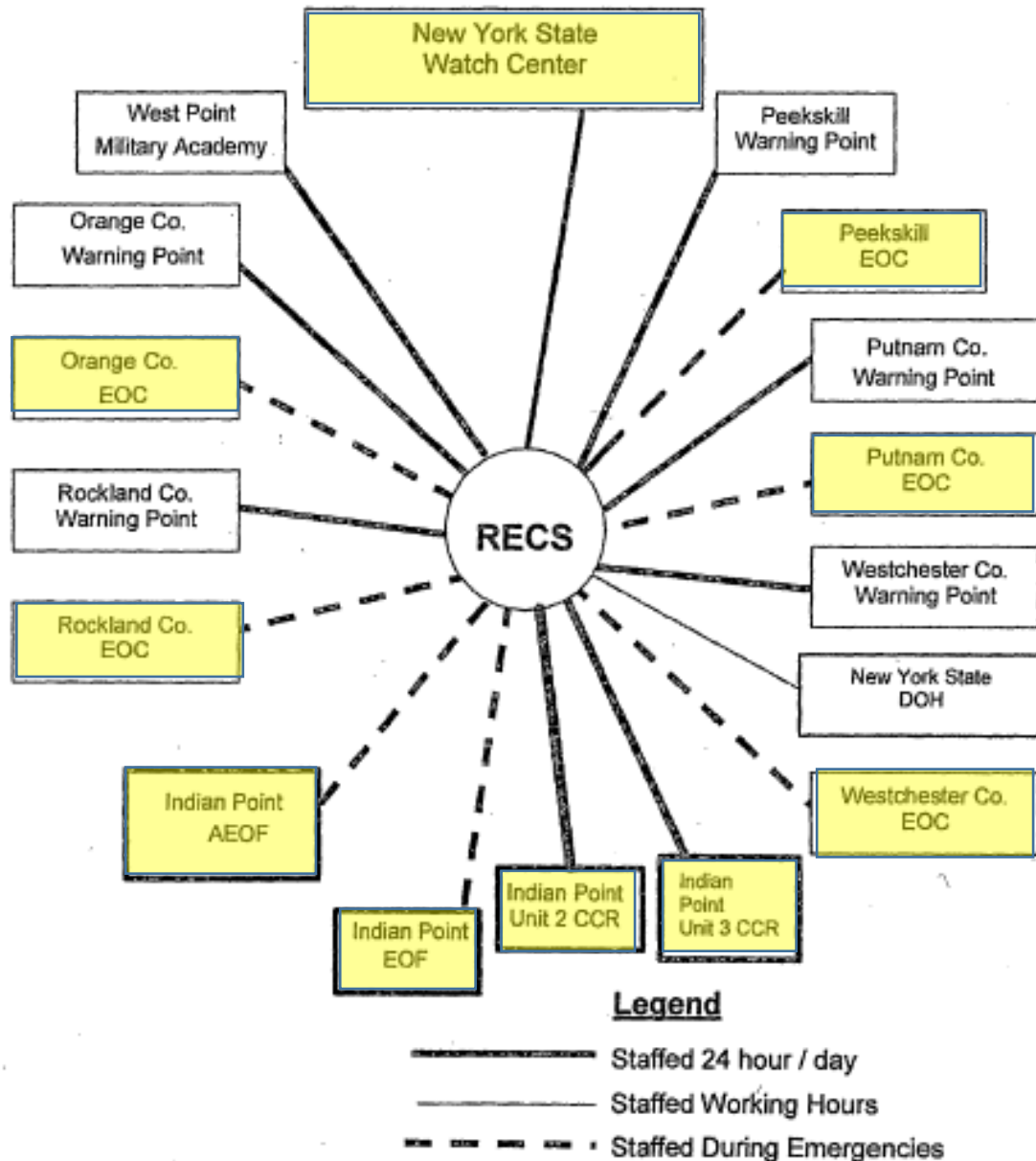
Reuter-Stokes Map



Offsite Radiation Monitors		
Last 15 minutes (MR/HR)		
Current Time:	10/27/2021 10:59:40 AM	
TAGNAME	VALUE	TIMESTAMP
RADMON1.MID	0.0081	10/27/2021 10:57:38 AM
RADMON2.MID	0.0078	10/27/2021 10:57:38 AM
RADMON3.MID	0.0089	10/27/2021 10:57:38 AM
RADMON4.MID	0.0070	10/27/2021 10:57:38 AM
RADMON5.MID	0.0078	10/27/2021 10:57:38 AM
RADMON6.MID	0.0078	10/27/2021 10:57:38 AM
RADMON7.MID	0.0076	10/27/2021 10:57:38 AM
RADMON8.MID	0.0078	10/27/2021 10:57:38 AM
RADMON9.MID	0.0079	10/27/2021 10:57:38 AM
RADMON10.MID	0.0067	10/27/2021 10:55:08 AM
RADMON11.MID	0.0057	10/27/2021 10:57:38 AM
RADMON12.MID	0.0079	10/27/2021 10:57:38 AM
RADMON13.MID	0.0106	10/27/2021 10:57:38 AM
RADMON14.MID	0.0072	10/27/2021 10:57:38 AM
RADMON15.MID	0.0068	10/27/2021 10:57:38 AM
RADMON16.MID	0.0072	10/27/2021 10:57:38 AM

“Pressurized ionization chambers [made by Reuter Stokes], one in each of the 16 sectors are located at various distances between the site boundary and 2 miles. The radiation data is collected by a computer system at the Indian Point Energy Center that allows access to this information through the Meteorological, Radiological and Plant Data Acquisition System (MRPDAS). The information from these systems is available at all IPEC facilities through the Entergy computer network. This information is also available to offsite Emergency Operation Centers via MRPDAS through a secure internet portal to the Entergy computer network. Data from these fixed field measurement sites may be used to verify the travel path of a radiological release and to estimate whole body exposure rates offsite.” (page H-8)

Figure F-1.1 Radiological Emergency Communications System

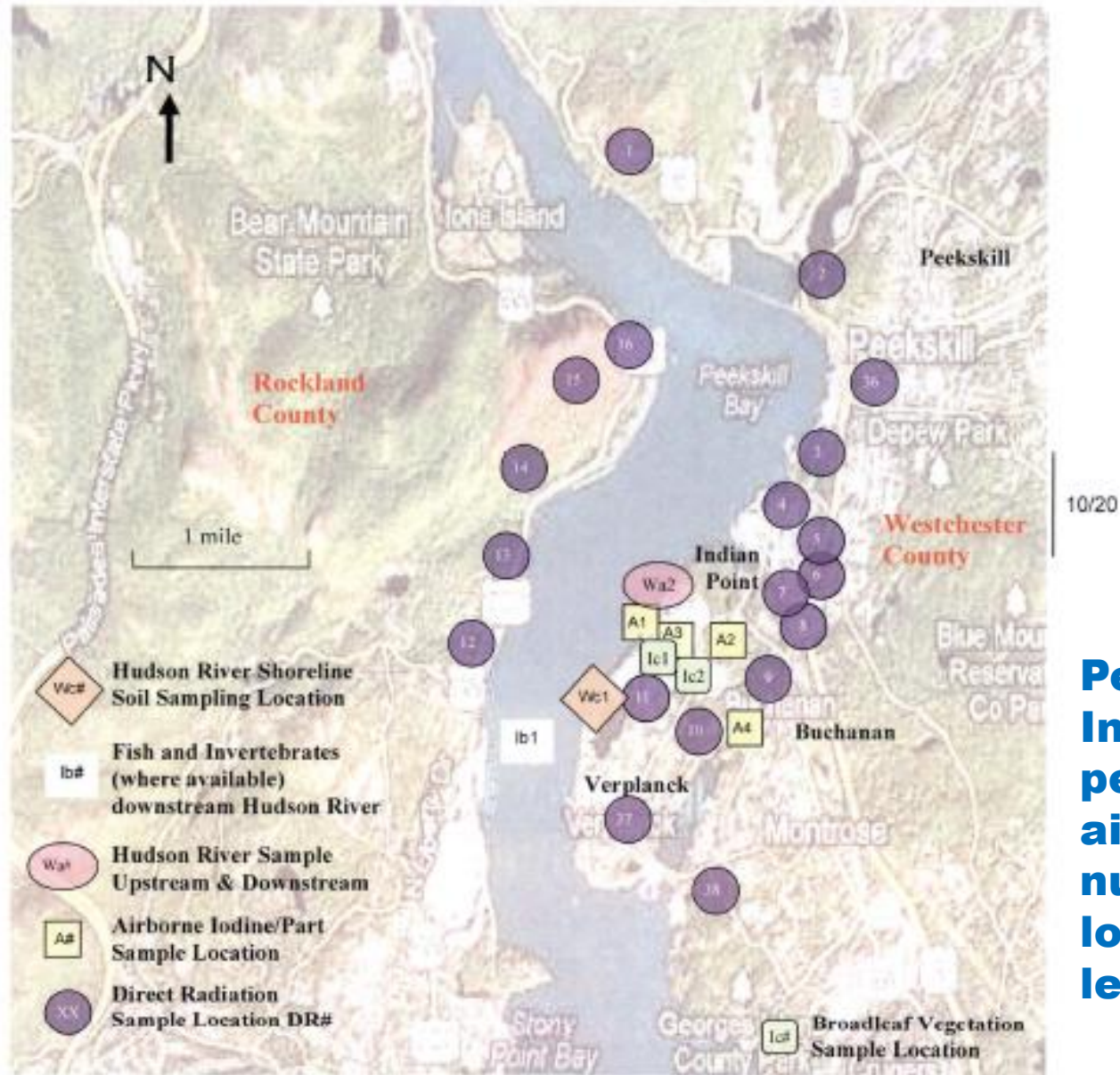


Continuous radiation levels from the 16 offsite Reuter Stokes monitors are accessible at onsite and offsite locations.

Radiation Detection

Offsite Sampling and Surveying

Environmental Sampling Points Within Two Miles of Indian Point

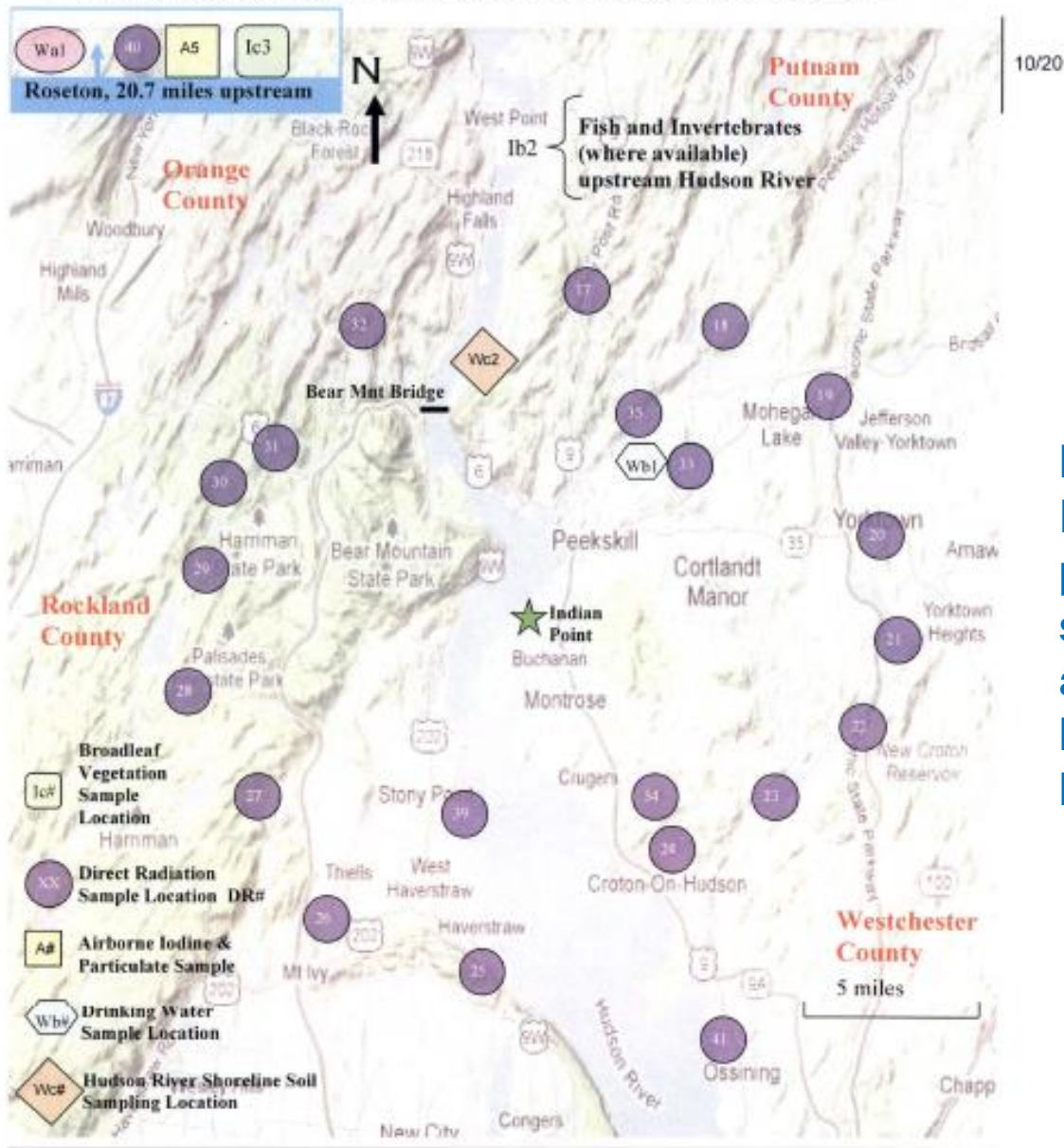


Per federal regulations, Indian Point's owner periodically samples air, soil and water at numerous offsite locations for radiation levels.

APPENDIX G

(Page 6 of 7)

Environmental Sampling Points Greater Than Two Miles from Indian Point



Per federal regulations, Indian Point's owner periodically samples air, soil, vegetation and water at numerous offsite locations for radiation levels.



Environmental Radiation Surveillance Indian Point Readings: Beginning 20...

This dataset measures the air and water near Indian Point and other locations(background) around NYS to determine the

Find in this Dataset

More Views Filter Visualize Export Discuss Embed About

Location Code	Sample Type	Sample Location	Sampling Frequency	Sample ID	Isotope Name	Value	Units	Graph Value	Comment
5951-001	AIR	CORTLANDT, NYU METEOROLOGICAL TOWER	WEEKLY	2018-09-14T00:00:00	GROSS BETA	2.85+/-0.74	pCi/1000M3	2.85	
5951-002	WATER	HUDSON RIVER AT VERPLANK DOWNSTREAM OF INDIAN PT	WEEKLY	2018-09-07T00:00:00	GROSS BETA	42+/-25	pCi/L	42	
5951-002	WATER	HUDSON RIVER AT VERPLANK DOWNSTREAM OF INDIAN PT	WEEKLY	2018-09-07T00:00:00	GROSS ALPHA	<0.17	pCi/L	0	
5951-001	AIR	CORTLANDT, NYU METEOROLOGICAL TOWER	WEEKLY	2018-09-07T00:00:00	IODINE - 131	<5.3	pCi/1000M3	0	
5951-001	AIR	CORTLANDT, NYU METEOROLOGICAL TOWER	WEEKLY	2018-09-07T00:00:00	GROSS BETA	3.83+/-0.57	pCi/1000M3	3.83	
5951-002	WATER	HUDSON RIVER AT VERPLANK DOWNSTREAM OF INDIAN PT	MONTHLY	2018-08-31T00:00:00	ZIRCONIUM - 95	<7.2	pCi/L	0	
5951-002	WATER	HUDSON RIVER AT VERPLANK DOWNSTREAM OF INDIAN PT	MONTHLY	2018-08-31T00:00:00	TRITIUM (HTO)	<100	pCi/L	0	
5951-002	WATER	HUDSON RIVER AT VERPLANK DOWNSTREAM OF INDIAN PT	MONTHLY	2018-08-31T00:00:00	RUTHENIUM - 106	<3.1	pCi/L	0	
5951-002	WATER	HUDSON RIVER AT VERPLANK DOWNSTREAM OF INDIAN PT	WEEKLY	2018-08-31T00:00:00	GROSS BETA	15+/-10	pCi/L	15	
5951-002	WATER	HUDSON RIVER AT VERPLANK DOWNSTREAM OF INDIAN PT	WEEKLY	2018-08-31T00:00:00	GROSS ALPHA	<14	pCi/L	0	
5951-002	WATER	HUDSON RIVER AT VERPLANK DOWNSTREAM OF INDIAN PT	MONTHLY	2018-08-31T00:00:00	CESIUM - 137	<2.2	pCi/L	0	
5941-002	WATER	HUDSON RIVER, BUCHANAN INLET	MONTHLY	2018-08-28T00:00:00	ZIRCONIUM - 95	<3.7	pCi/L	0	
5941-002	WATER	HUDSON RIVER, BUCHANAN INLET	MONTHLY	2018-08-28T00:00:00	TRITIUM (HTO)	<150	pCi/L	0	

New York State samples the air and water around Indian Point at weekly and monthly intervals checking for radionuclide emissions such as tritium, cesium, and ruthenium.

Harmful airborne releases of radiation are prevented by:

- **Pre-work checks for location and nature of hazardous materials**
- **Measures during work activities to control the airborne release of hazardous materials**
- **Point-of-release (i.e., vent or exhaust duct) radiation monitors to detect elevated radiation levels and stop the discharge flow**
- **Onsite continuous radiation monitoring to backup the point-of-release monitoring and guard against releases via unplanned paths**
- **Offsite radiation sampling and surveying to backup other checks and also guard against unexpected concentrations or bio-accumulations of radiation released below federal limits**

These measures collectively lessen the likelihood of harmful airborne releases, but not to zero risk. So, they are further backed by emergency response measures.

Radiation Response

The NRC has four emergency classifications, listed in order of decreasing severity:

General Emergency

Site Area Emergency

Alert


Unusual Event

The 1979 accident at Three Mile Island has been the only General Emergency (so far). There have been two Site Area Emergencies, several more Alerts, and numerous Unusual Events.

The emergency classifications have pre-defined entry conditions (called Emergency Action Levels) with pre-established notifications.

The pre-defined entry conditions require worsening conditions for an Unusual Event to rise an Alert and to a Site Area Emergency and to a General Emergency.

But the process does not require beginning with an Unusual Event – when conditions warrant an Alert or Site Area Emergency, that declaration is to be made and made quickly.

 IPEC EMERGENCY PLAN	NON-QUALITY RELATED DOCUMENT	IPEC-EP	Rev. 29
	INFORMATIONAL USE	21-02	

CONTROLLED

Indian Point Energy Center

Emergency Plan

Prepared by:

Gary Norton *Gary Norton* 4/26/2021
 Print Name Signature Date

Approval:

Frank J. Mitchell *FJ Mitchell* 4/26/2021
 Print Name Signature Date

Effective Date: May 17, 2021

“The primary hazard consideration at the Indian Point Energy Center is the potential unplanned release of radioactive material resulting from an accident at the site. The probability of such a release is considered very low due to plant design and strict operational guidelines enforced by the Nuclear Regulatory Commission (NRC). However, Federal regulations and common sense require that an emergency preparedness program exist for each commercial nuclear power station.” (page 3)

A key aspects of the Indian Point emergency plan (consistent with emergency plans across the country).

“The expectation is that emergency classifications are to be made as soon as conditions are present and recognizable for the classification, but within 15 minutes or less in all cases of conditions present.” (page 4)

The NRC has sanctioned owners for having meet the entry conditions for an emergency classification during actual events or emergency exercises but having failed to make that call.

Another key aspect of the Indian Point emergency plan (consistent with emergency plans across the country).

“To the extent possible, the EALs are symptom-based. That is, the action level threshold is defined by values of key plant operating parameters that identify emergency or potential emergency conditions. This approach is appropriate because it allows the full scope of variations in the types of events to be classified as emergencies.” (page 7)

Prior to Three Mile Island, emergency response depended on identifying the accident and responding to it. Since then, the process seeks to hasten mitigation by responding to conditions before definitively defining their causes.

Radiation Response

Unusual Event Declaration

“The initiating conditions within this category are as follows:

UNUSUAL EVENT

- 1. Any release of gaseous or liquid radioactivity to the environment >2 times the radiological effluent ODCM [Offsite Dose Calculation Manual] limits for >60 minutes.**
- 2. Unplanned rise in plant radiation levels.” (page D-9)**

Basis/purpose for declaring an Unusual Event upon airborne releases exceeding twice the ODCM limits:

“Gaseous releases in excess of two times the site ODCM instantaneous limits that continue for 60 minutes or longer represent an uncontrolled situation and hence, a potential degradation in the level of safety. The final integrated dose (which is very low in the Unusual Event emergency class) is not the primary concern here; it is the degradation in plant control implied by the fact that the release was not isolated within 60 minutes. The values shown for each monitor represents two times the calculated ODCM release rates.” [underlining and italicizing added for emphasis] (page 31)

An unplanned increase in radiation requiring an Unusual Event declaration is defined as being:

Category: A – Radioactivity Release / Area Radiation
Subcategory: 2 – Onsite Rad Conditions & Irradiated Fuel Events
Initiating Condition: Unplanned rise in plant radiation levels
EAL:

AU2.2 Unusual Event

Unplanned valid area radiation monitor reading or survey results increase by a factor of 1,000 over normal levels*

* Normal levels can be considered as the highest reading in the past 24 hours excluding the current peak value

Mode Applicability:

All

Radiation Response

Unusual Event

“Notification of Unusual Event

- 1. A Notification of Unusual Event is declared by the Shift Manager if any Unusual Event threshold listed in Section D (Table D-1) is met or exceeded,**
- 2. Depending on the particular circumstances of the situation, the Control Room personnel under the Shift Manager's direction alerts the affected Unit's personnel and non-affected Unit's Control Room personnel and gives instructions regarding the event, using the public address system, the telephone or by an alternate method. Distinctive sounding signals are used to announce fire alarms or site emergencies.”**

“Notification of Unusual Event (continued)”

- 3. Depending on the particular circumstance of the situation, the Shift Manager has the discretion to activate all or a portion of the ERO. During normal working hours, the necessary personnel are available in the plant and are contacted by Public Address System, an electronic notification system or alternate methods. During off-hours, individuals can be contacted at their homes by telephone or electronic notification system. ERO member telephone numbers are in the Emergency Telephone Directory available in the Control Rooms and Emergency Response Facilities.”**

“Notification of Unusual Event (continued)”

- 4. Immediate Notification (within 15 minutes) of an Unusual Event is made by the Shift Manager or designee to the New York State, Westchester, Rockland, Putnam and Orange County and Peekskill Warning Points, and the West Point Military Police Desk using the Radiological Emergency Communications System (RECS) phone (primary method) or backup methods: Local Government Radio (LGR) or commercial phone lines. The New York State Warning Point relays the information to the New York State Department of Health.**
- 5. The Nuclear Regulatory Commission's Operations Center is notified using the Emergency Notification System (ENS) phone or commercial phone lines.**
- 6. Individuals from Corporate Headquarters are notified by phone or other electronic notification system. (pages E-1 and E-2)”**

Radiation Response

Alert Declaration

“The initiating conditions within this category are as follows:

ALERT

- 1. Any release of gaseous or liquid radioactivity to the environment that exceeds significant multiples of the Offsite Dose Calculation Manual (ODCM) limits for 15 minutes or longer.**
- 2. Damage to irradiated fuel or loss of water level that has or will result in the uncovering of irradiated fuel outside the reactor vessel.**
- 3. Rise in radiation levels within the facility that impedes operation of systems required to maintain plant safety functions.” (page D-9)**

AA1.1 Alert

Any valid gaseous monitor reading > Table A-1 column "Alert" for ≥ 15 min. (Note 2)

Table A-1 Effluent Monitor Classification Thresholds					
Monitor		GE	SAE	Alert	UE
Gaseous	R-27	7.5 E+07 $\mu\text{Ci/sec}$ (2.3 E+00 $\mu\text{Ci/cc}$)	7.5 E+06 $\mu\text{Ci/sec}$ (2.3 E-01 $\mu\text{Ci/cc}$)	1.4 E+06 $\mu\text{Ci/sec}$ (4.2 E-02 $\mu\text{Ci/cc}$)	2.6 E+05 $\mu\text{Ci/sec}$ (8.0 E-03 $\mu\text{Ci/cc}$)
	R-44 [14]	N/A	N/A	4.2 E-02 $\mu\text{Ci/cc}$	8.0 E-03 $\mu\text{Ci/cc}$
Liquid	R-54 [18]	N/A	N/A	4.0E-02 $\mu\text{Ci/cc}$	2.5E-03 $\mu\text{Ci/cc}$
	R-49 [19]	N/A	N/A	5.8E-02 $\mu\text{Ci/cc}$	5.8E-04 $\mu\text{Ci/cc}$

Note 2: The Emergency Director should not wait until the applicable time has elapsed but should declare the event as soon as it is determined that the release duration has exceeded, or will likely exceed, the applicable time. In the absence of data to the contrary, assume that the release duration has exceeded the applicable time if an ongoing release is detected and the release start time is unknown.

Mode Applicability:

All

The Alert threshold is about 5 times higher than the Unusual Event (UE) threshold. The Site Area Emergency (SAE) threshold is about 5 times higher than the Alert threshold. The General Emergency (GE) threshold is ten times higher than the Site Area Emergency level.

Radiation Response

Alert

“Alert

- 1. An Alert is declared by the Shift Manager in the event an Alert threshold listed in Section D (Table D-1) is met or exceeded: If the EOF is Operational, this function would be performed by the ED.**
- 2. Notification of site personnel is accomplished by the Control Room personnel initiating the site assembly alarm and/or via public address announcements. In addition, the affected unit's Control Room personnel also contact the unaffected unit's Control Room personnel.**
- 3. In the case of a fire, additional notification in the form of a distinctive siren is also provided: The Shift Manager or designee would request, by phone, outside assistance from local support services as necessary.”**

“Alert (continued)”

4. The Shift Manager initiates the activation of the Emergency Operations Facility, Technical Support Center, Operations Support Center and Joint Information Center. During normal working hours, the necessary personnel are available in the plant and are contacted. by the Public Address System or electronic notification system. During off-hours, individuals can be contacted at their homes by telephone or electronic notification system. ERO member telephone numbers are in the Emergency Telephone Directory *available* in the Control Rooms and Emergency Response Facilities.”

“Alert (continued)”

- 5. Immediate Notification (within 15. minutes) of an Alert is made by the Shift Manager or designee to the New York State, Westchester, Rockland, Putnam, Orange County, and Peekskill Warning Points and West Point Military Police Desk using the Radiological Emergency Communications System (RECS) phone (primary method) or backup methods: Local Government Radio (LGR) or commercial phone lines. The New York State Warning Point relays the information to the New York State Department of Health.**
- 6. Nuclear Regulatory Commission's Operations Center is notified using the Emergency Notification System (ENS) or commercial phone lines.**
- 7. Individuals from Corporate Headquarters are notified by phone or other electronic notification system.**
- 8. If there is a radiological release involved with the event, the Shift Manager/ED or designee will provide information on the release to the offsite authorities.”**

Radiation Response

Site Area Emergency Declaration

“SITE AREA EMERGENCY

- 1. Offsite dose resulting from an actual or imminent release of gaseous radioactivity greater than 100 mRem TEDE or 500 mRem thyroid CDE for the actual or projected duration of the release.” (page D-9)**

<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML21144A194>

“This EAL addresses radioactivity releases that result in doses at or beyond the site boundary that exceed 10% of the EPA Protective Action Guides (PAGs). Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public.” (page 45)

<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML21145A072>

“SITE AREA EMERGENCY

- 1. Offsite dose resulting from an actual or imminent release of gaseous radioactivity greater than 100 mRem TEDE or 500 mRem thyroid CDE for the actual or projected duration of the release.” (page D-9)**

Unusual Event and Alert classifications involve releases of radiation above normal levels. A Site Area Emergency should be declared when the ongoing release or projected release could result in an offsite radiation dose exceeding the 100 millirem annual limit.

A Site Area Emergency involves radiation levels more than 25 times higher than the levels that initiate an Unusual Event.

Radiation Reporting

Offsite Sampling/Surveying

Table D 3.5.1-2 (page 1 of 1)
Reporting Levels for Radioactivity in Environmental Samples **

RADIONUCLIDE ANALYSIS	WATER (pCi/L)	AIRBORNE PARTICULATE OR GASES (pCi/m ³)	FISH (pCi/kg, wet)	MILK (pCi/L)	FOOD PRODUCTS (pCi/kg, wet)
H-3	20,000 *				
Mn-54	1,000		30,000		
Fe-59	400		10,000		
Co-58	1,000		30,000		
Co-60	300		10,000		
Ni-63 ***	300		1,000		
Zn-65	300		20,000		
Sr-90 ***	8*		40		
Zr-95	400				
Nb-95	400				
I-131	2 *	0.9		3	100
Cs-134	30	10	1,000	60	1,000
Cs-137	50	20	2,000	70	2,000
Ba-140	200			300	
La-140	200			300	

* Values provided are for drinking water pathways. If no drinking water pathway exists, higher values are allowed, as follows:

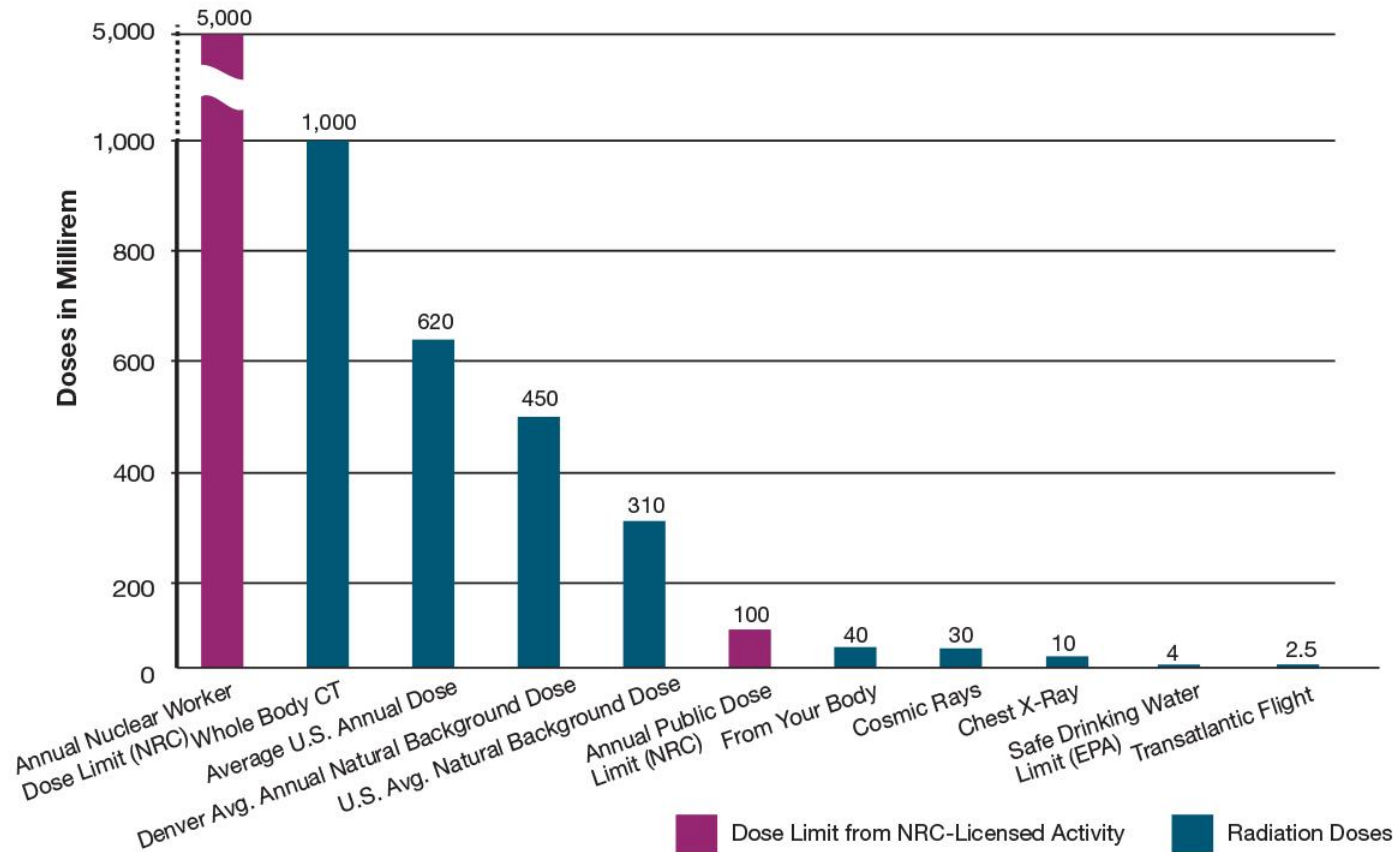
H-3 30,000 pCi/L (This is a 40 CFR 141 value)
Sr-90 12 pCi/L
I-131 20 pCi/L

The offsite sampling and surveying efforts require a report to the NRC if radiation levels in the water, air, fish, milk or food products exceed thresholds.

Reporting may be too late to stop the release(s), but not too late to initiate steps to prevent ingestion of and exposure to the contaminated materials.

10/20

Radiation Doses and Regulatory Limits



Links for More Information

Indian Point Emergency Plan 05-17-2021

<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML21144A194>

Indian Point Emergency Action Level Technical Bases 05-17-2021

<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML21145A072>

Indian Point Offsite Dose Calculation Manual 10-30-2020

<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML21168A060>

Indian Point Annual Effluent Reports to the NRC

<https://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-specific-reports/ip2-3.html>

NRC's webpage on Emergency Preparedness and Response

<https://www.nrc.gov/about-nrc/emerg-preparedness.html>

EPA's webpage on Radiological Emergency Response

<https://www.epa.gov/radiation/radiological-emergency-response>

New York State Radiation Monitoring Reports

<https://health.data.ny.gov/Health/Environmental-Radiation-Surveillance-Indian-Point-/ms7x-sfpf/data>

Links for Less Information